

WHAT IS CLAIMED IS:

1. A method for producing hyperbranched polymers, said method comprising the step of heating a polymerizable reaction charge comprising (a) a monomer mixture comprising (i) at least one monoethylenically unsaturated monomer in an amount of about 50-99.9% by weight of the monomer mixture and (ii) one or more multiethylenically unsaturated monomers in an amount of about 0.1-50% by weight of the monomer mixture, and (b) if at least one ethylenically unsaturated monomer of said monomer mixture is not a thermally initiating monomer, a free radical polymerization initiator, to a temperature in the range from about 250°C to about 400°C in a continuous reactor which allows mixing of the reactor contents for a residence time of from about 2 minutes to about 60 minutes, provided that if the total amount of multiethylenically unsaturated monomer is less than 3% by weight of the monomer mixture then at least one of said one or more multiethylenically unsaturated monomers must be tri- or greater ethylenically unsaturated.
2. The method of claim 1, wherein the multiethylenically unsaturated monomer is selected from the group consisting of diethylenically unsaturated monomers, triethylenically unsaturated monomers, tetraethylenically unsaturated monomers and mixtures thereof.
3. The method of claim 2, wherein the temperature is in the range from about 300°C to about 350°C.
4. The method of claim 3, wherein the continuous reactor is a continuous stirred tank reactor or a continuous loop reactor.

5. The method of claim 4, wherein the multiethylenically unsaturated monomer is divinylbenzene.

6. The method of claim 5, wherein the monoethylenically unsaturated monomer is styrene or a mixture of styrene and another monoethylenically unsaturated monomer.

7. The method of claim 6, wherein the other monoethylenically unsaturated monomer is selected from the group consisting of α -methylstyrene, acrylic acid, methacrylic acid, methyl methacrylate, butyl acrylate, butyl methacrylate, hydroxyethyl methacrylate, hydroxypropyl methacrylate and hydroxypropyl acrylate.

8. The method of claim 7, wherein the divinylbenzene is present in the monomer mixture in an amount in the range from about 10% by weight to about 15% by weight of the polymer.

9. The method of claim 8, wherein the residence time is from about 10 minutes to about 20 minutes.

10. The method of claim 9, wherein the reactor is substantially filled.

11. A hyperbranched polymer produced by the method comprising the step of heating a polymerizable reaction charge comprising (a) a monomer mixture comprising (i) at least one monoethylenically unsaturated monomer in an amount of 50-99.1% by weight of the monomer mixture and (ii) one or more multiethylenically unsaturated monomers in an amount of about 0.1-50% by weight of the monomer mixture, and (b) if at least one ethylenically unsaturated monomer mixture is not a thermally initiating monomer, a free radical polymerization

initiator, to a temperature in the range from about 250°C to about 400°C in a continuous reactor which allows mixing of the reactor contents for a residence time of from about 2 minutes to about 60 minutes, provided that if the total amount of multiethylenically unsaturated monomer is less than 3% by weight of the monomer mixture then at least one of said one or more multiethylenically unsaturated monomers must be tri- or greater ethylenically unsaturated.

12. The hyperbranched polymer of claim 11, wherein the multiethylenically unsaturated monomer is selected from the group consisting of diethylenically unsaturated monomers, triethylenically unsaturated monomers, tetraethylenically unsaturated monomers and mixtures thereof.

13. The hyperbranched polymer of claim 12, wherein the temperature is in the range from about 300°C to about 350°C.

14. The hyperbranched polymer of claim 13, wherein the continuous reactor is a continuous stirred tank reactor or a continuous loop reactor.

15. The hyperbranched polymer of claim 14, wherein the multiethylenically unsaturated monomer is divinylbenzene.

16. The hyperbranched polymer of claim 15, wherein the monoethylenically unsaturated monomer is styrene or a mixture of styrene and another monoethylenically unsaturated monomer.

17. The hyperbranched polymer of claim 16, wherein the other monoethylenically unsaturated monomer is selected from the group consisting of α -methylstyrene, acrylic

acid, methacrylic acid, methyl methacrylate, butyl acrylate, butyl methacrylate, hydroxyethyl methacrylate, hydroxypropyl methacrylate and hydroxypropyl acrylate.

18. The hyperbranched polymer of claim 17, wherein the divinylbenzene is present in the monomer mixture in an amount in the range from about 10% by weight to about 15% by weight of the polymer.

19. The hyperbranched polymer of claim 18, wherein the residence time is from about 10 minutes to about 20 minutes.

20. The hyperbranched polymer of claim 19, wherein the reactor is substantially filled.

21. A hyperbranched polymer comprising at least about 3% by weight of repeat units derived from divinylic monomers, about 50 to about 97% by weight of repeat units derived from monoethylenically unsaturated monomers and having a polydispersity of less than about 20.

22. The hyperbranched polymer of claim 19 with at least 6% by weight of repeat units derived from divinylic monomers.